

WHAT IS CLAIMED IS:

1. A web pleating apparatus having a mutually orthogonal machine direction, a cross machine direction and a Z-direction, the apparatus comprising:

a first series of elongate spaced protuberances converging in the machine direction;

a second series of elongate spaced protuberances converging in the machine direction;

wherein said first series of protuberances and said second series of protuberances interleave in the Z-direction; and,

said first series and said second series of interleaved protuberances being capable of folding a pleatable web into a generally pleated pattern of machine direction pleats upon contact of said web with said first and second series of protuberances.

2. The web pleating apparatus of Claim 1 wherein said apparatus has a machine direction inlet to said first and second series of elongate spaced protuberances and said apparatus has a machine direction outlet from said first and second series of elongate spaced protuberances wherein said web maintains contact with said first series and said second series of interleaved protuberances from said inlet to said outlet.

3. The web pleating apparatus of Claim 1 wherein said converging elongate spaced protuberances are blades.

4. The web pleating apparatus of Claim 1 further comprising a converging tunnel disposed downstream in the machine direction of said first and second series of interleaved protuberances to receive said web and wherein said pleated web is constrained by said converging tunnel to maintain said pleated pattern when said web is within said converging tunnel.

5. The web pleating apparatus of Claim 4 wherein said converging tunnel comprises an arcuate cavity for receiving said web.

6. The web pleating apparatus of Claim 1 further comprising a drive roll for pushing said pleatable web into said interleaved protuberances.

7. The web pleating apparatus of Claim 6 wherein said first and second spaced protuberances have a first coefficient of friction and said drive roll has a second coefficient of friction and wherein said second coefficient of friction is greater than said first coefficient of friction.

8. The web pleating apparatus of Claim 1 further comprising a heater for heating said pleated web.

9. The web pleating apparatus of Claim 8 further comprising a cooler for cooling said web and being disposed downstream from said heater.

10. The web pleating apparatus of Claim 1 further comprising a scoring device wherein said scoring device is capable of imparting indentations to said pleatable web prior to said pleatable web contacting said first and said second series of converging spaced protuberances and wherein said indentations are aligned with said first and said second series of converging elongate spaced protuberances.

11. The web pleating apparatus of Claim 10 wherein said scoring device comprises first and second axially rotatable rolls having mutually parallel axes, each of said first and second rolls comprising inter-engaging corrugations for imparting said indentations upon said pleatable web.

12. The web pleating apparatus of Claim 11 wherein said first and second rolls are constrained to maintain a fixed gap therebetween, said gap being less than the thickness of a pleatable web interposed between said first and second rolls during operation of said apparatus.

13. The web pleating apparatus of Claim 1 wherein said first series of protuberances and said second series of protuberances are spaced apart in the cross-machine direction.

14. A method for forming a pleatable web comprising the steps of:

providing a pleatable web;
scoring said pleatable web in the machine direction;
transporting said scored web relative to a first series and second series of machine direction converging elongate spaced protuberances interleaved in the Z-direction; and,
folding said scored web with said interleaved first series and second series of converging protuberances wherein said interleaved converging protuberances pleat said pleatable web in the machine direction.

15. The method of Claim 14 further comprising the step of:

forming said pleated web into an arcuate shape.

16. The method of Claim 15 wherein said step of forming said web into an arcuate shape comprises the steps of:

providing a forming tunnel having a cross-section converging from a generally linear inlet to an outlet having a generally arcuate shape; and,
inserting said web into said tunnel.

17. The method of Claim 14 wherein said folding plastically deforms said pleatable web.

18. The method of Claim 14 wherein the step of transporting said pleatable web relative to said interleaved first and second series of converging elongate spaced protuberances comprises pushing said pleatable web relative to said interleaved first and second series of converging elongate spaced protuberances.

19. The method of Claim 14 further comprising the step of:
heating said pleated web.

20. A filter which comprises:

a pleated web formed by providing a pleatable web, scoring said pleatable web, transporting said scored web relative to a first and second series of interleaved converging elongate spaced protuberances, and, folding said scored web with said interleaved first and second series of converging protuberances wherein said interleaved converging protuberances pleat said pleatable web.